WITHDRAWN

REPORT on Communicable Diseases in Port Louis

By

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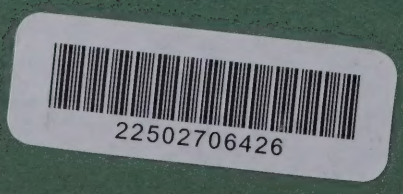
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No. 138/R/52

GOVERNMENT HOUSE,
PORT LOUIS.
25th June, 1921.

THE HONOURABLE THE COLONIAL SECRETARY.

COMMUNICABLE DISEASES IN PORT LOUIS.

SIR,—At the close of my report on the Sanitation of Port Louis I stated that it seemed advisable to consider in a later report the question of the communicable diseases present in the town.

This report I now have the honour to submit.

Naturally it cannot be based on intensive personal observations. I have neither had the time nor the opportunity to carry out such investigations but I am now fairly familiar with the conditions obtaining in Port Louis and the diseases with which I propose to deal are not peculiar to Mauritius and are, in all tropical countries where they occur, due to certain causes which, generally speaking, are well known and which are, for the most part, preventable. It is not my intention to write a treatise on these maladies but merely to consider their prevalence in Port Louis, their effects on the population, and the means which should be taken to eradicate them. **Scope of report.**

With some of them, such as malaria, plague, leprosy and beri-beri I have already dealt to some extent and hence will only refer very briefly to them. The others requiring attention are ankylostomiasis and some other helminthic infections, tuberculosis, venereal diseases, puerperal fever, dysentery, diarrhœa enterica, influenza, pneumonia, diphtheria, schistosomiasis filariasis and certain skin diseases. It is convenient to consider them in alphabetical order. **Diseases to be considered**

1. ANKYLOSTOMIASIS.—In an area like Port Louis District which is chiefly urban, where the rainfall is comparatively small and where a night-soil service, despite its numerous defects, exists, it is to be expected that the incidence of ankylostomiasis should not be great. This is found to be the case. Kendrick in his recent report states that it is only 29.4% which is the smallest in the Island. At the same time no one can view such a state of things with equanimity. As nearly 30% of the inhabitants of Port Louis District harbour ankylostomes it is evident that there is a considerable degree of soil pollution, even if in a certain proportion of cases the infection was derived outside the area. The following cases from the Port Louis District were treated in the Civil Hospital :— **Incidence of ankylostomiasis in Port Louis**

1916	1917	1918	1919	1920
Not available		24	19	20

Statistics.

There is no return as regards ankylostomiasis from the town dispensaries. Presumably cases have been missed.

In the majority of instances the infection doubtless takes place directly from polluted soil, the larvae of the ankylostomes penetrating the skin of the feet and legs but the rôle of water contaminated by infected soil cannot be wholly excluded and it is possible that in Port Louis, as elsewhere, children, and perhaps also a few adults, have contracted the habit of earth-eating and so ingest the larvæ. **Sources of infection.**

So far as I have been able to see, the population in the Port Louis District does not present, in any marked degree, the more serious symptoms of the disease. In the schools, however, one has noted children with puffy faces who were at the same time distinctly anæmic while in the hospitals typical cases may be seen. Generally speaking, however, the grade of infection appears to be light which is a fortunate thing, as persons heavily infected with ankylostomes have feeble powers of resistance and readily fall victims to such diseases as malaria, influenza, dysentery and indeed to any debilitating disorder. **Effect on population.**

The fact that ankylostomiasis is frequently associated with fever, that there is indeed a distinct ankylostomiasis fever, often of an intermittent type, is apt to be forgotten. **Ankylostomiasis fever.**

The question of its possible confusion with malaria is one which must be considered, more especially, however, in connection with rural districts.

It is hoped that by co-operation with the workers of the Rockefeller Foundation an efficient method of treating cases will be introduced. **Treatment.**

The most satisfactory vermifuge is oil of chenopodium. It is interestiug to note that the plant, *Chenopodium ambrosioides* var. *anthelminticum*, from the fruits of which the oil is distilled, grows naturally in Mauritius where it is known as Botrys. **Oil of chenopodium.**

A commercial possibility.

At my request Dr. Tempany kindly made several distillations from the local plant but unfortunately, the yield of oil proved low. Accordingly, in addition to placing the local plant under cultivation, he is to obtain from the U. S. A. some of the high class seed for cultivation and it is likely that it will then be possible to obtain a satisfactory yield of oil of good quality. Indeed there would seem reason to believe that growing *Chenopodium ambrosioides* var. *anthelminticum*, on a large scale under scientific control might prove a remunerative step in Mauritius. The climate and soil appear well adapted to the plant and the oil is very valuable, its present market price being £2 per 1b. The supply is limited and there will soon be an enormous demand for it throughout the tropics where active hookworm compaigns are being established.

Hence I think it likely, as originally suggested by Dr. Henry of the Welcome Chemical Research Laboratories in London, that the introduction of *C. ambrosioides* from Maryland may be the start of a new and valuable industry in Mauritius.

Prophylaxis.

The prophylactic measures against ankylostomiasis must follow the general laws for the prevention of soil and water contamination laid down in my report on the Sanitation of Port Louis.

Use of petroleum fire sprays.

In addition I think that something may be accomplished by the use of petroleum fire sprays or flammen-werfer which I advocated for clearing work in connection with anti-malarial measures in the vicinity of the town. Firing the ground has long been known as a preventive method in ankylostomiasis but, as usually carried out, it is troublesome and uncertain. With fire sprays, however, places presumably intensely infected could be speedily and effectively sterilized at a comparatively small cost.

In all probability the War Office possesses a surplus stock of flammen-werfer of which it may be glad to dispose. I would therefore suggest that the authorities there be approached with a view to obtaining a supply of these useful apparatus.*

2. Beri-Beri. — I have already submitted a report on beri-beri (My 129/R/47 of 16.1.21.) (Appendix I.) Hence it is only necessary to point out that the following records are available as regards its incidence :—

Cases from Port Louis District admitted to the Civil Hospital.

1916	1917	1918	1919	1920
—	—	—	—	—
Not available.		120	49	30

Cases treated at the Central Dispensary.

1916	1917	1918	1919	1920
—	—	—	—	—
...	...	16	30	8

Cases treated at the Eastern Dispensary

1916	1917	1918	1919	1920
—	—	—	—	—
...	...	...	27	44

Note.—The Eastern Dispensary only dates from 1919.

Beri-beri amongst the Chinese.

I understood that the Chinese had a good and varied diet but on enquiry learn that, while the wealthy shop owners have an ample supply of provender, the poorer Chinese feed principally on Siam rice which is highly milled.

Recommendation as regards the importation of rice.

This but adds force to my recommendation that the importation of highly polished rice be prohibited and that only Big Mill Burmah rice which analysis has shown to be safe, be admitted to the Colony, provided this is a feasible proposition under existing conditions.

3. Diphtheria.—It is fortunate that diphtheria is not much in evidence as the following figures show :—

Cases notified in Port Louis District.

1916	1917	1918	1919	1920
—	—	—	—	—
...	...	3	2	3

Cases admitted to Civil Hospital.

1916	1917	1918	1919	1920
—	—	—	—	—
Not available.		1	0	1

In all probability the climatic conditions are inimical to the spread of *B. diphtheriae* which does not usually flourish in the tropics. If it did there can be no doubt it would find a happy hunting ground in the slums of Port Louis. It is of course possible that a virulent strain of the organism might be introduced and produce an outbreak of the disease. Hence it seems

* His Excellency the Governor has already caused steps to be taken in this direction.

advisable to direct attention to the value of the so-called Schick test. This consists in the injection intradermally of a minute quantity of active diphtheria toxin. The resultant reaction enables one to say whether or not the individual injected is susceptible to infection. If he proves to be so he is given a prophylactic dose of anti-diphtheritic serum. It can be seen how useful such a method is in the case of schools and institutions in which one or two cases of diphtheria have occured. Schick test for diphtheria.

I am of opinion that a small stock of Schick's reagent should be kept in stock by the Medical and Health Department for use in emergencies.

4. Dysentery and Diarrhœa.—These may be classed together, though dysentery is due chiefly to one or other of two causative agents the *Entamœba histolytica* and *Bacillus dysenteriae* of which there are several distinct strains, while diarrhœa may be due to various causes; chill, errors in diet, flagellate infection which is known to occur in Mauritius, food poisoning, &c. Causes of dysentery. Causes of diarrhœa.

It is worth noting that, considering the prevalence of pigs in the Port Louis District, there is every probability that so-called "Ciliate" dysentery due to *Balantidium coli* also exists. I am told it has not been recognised, but, if carefully looked for, I should think its presence would be established. Ciliate dysentery.

Bilharzial dysentery apparently does not occur in Mauritius, intestinal bilharziasis being so far unknown. There is however a form of malarial dysentery which is frequently not recognised but the possibility of which as a complication of malaria in Mauritius should be borne in mind. Apparent absence of bilharzial dysentery. Malarial dysentery.

It is unnecessary for me to say much on the subject of dysentery as the Government is in possession of the excellent "Interim Report of the Dysentery Committee, 1920" with the findings of which I am generally in accord. I note, however that the Committee, says nothing as regards the type of dysentery which prevails. This is a matter of great importance, not so much from the preventive point of view as from that of treatment. Dr. Barbeau, who was President of the Committee, informs me that amœbic dysentery is much more common than the bacillary form though the latter exists. War experience has shown that when dysentery assumes epidemic proportions it is always of bacillary origin but, in a place like Mauritius, where the amœbic variety is the more prevalent, one would expect that in any outbreak mixed cases would occur. It is by no means uncommon to have an acute bacillary infection superimposed upon an amœbic dysentery. Report of Dysentery Committee. Prevailing type of dysentery.

I would direct notice to the danger of carrier cases in both types of dysentery and more especially to the cyst carrier in amœbic dysentery. Carrier cases.

Carriers are of great importance in connection with the preparation and serving of food and it was partly on this account that special attention was directed in the report on Port Louis to the question of restaurants and eating houses.

The role of flies as vectors of dysentery and more especially of the amœbic cyst must not be forgotten, though in Mauritius it is possible that polluted water supplies and infection from "carriers" play a more important part than flies which, I am inclined to think, are specially dangerous in hot, and dry countries. I understand that diarrhœa is very prevalent, particularly amongst children, during the fruit season. This is always the case in tropical countries and special care is necessary in eliminating from shops and markets fruit which has become overripe or which has begun to decompose. Rôle of flies.

Flagellate diarrhœa, due to certain protozoal organisms inhabiting the intestine, is known to exist, the forms which occur being those due to *Lamblia (Giardia) intestinalis* and *Trichomonas intestinalis*. Flagellate diarrhœa.

Infection in such cases is probably due to transmission of the parasite to the healthy individual, from a person harbouring the organism, by means of food and more especially uncooked food such as salads. It is possible also that flies may play a part by contaminating food-stuffs. Diarrhœa, the result of food poisoning, cannot be ignored and in this connection it is important to secure the cleanliness of cooking utensils, particularly in restaurants and eating houses. Dirty pots and pans have frequently led to outbreaks of severe diarrhœa which may even resemble cholera. I notice that Enteritis figures largely in the returns: Thus there were 14 deaths from this cause in Port Louis last April. It appears that the term connotes chiefly the infective diarrhœa of infants and young children, a condition due to insanitary surroundings and faulty feeding. Food-poisoning.

Europeans or persons of European descent in Mauritius should be warned against the habit of wearing cholera belts both by day and night. The use and abuse of cholera belts.

Where there is a marked difference in the day and night temperature it may be advisable to don a cholera belt before going to bed but the wearing of such a belt throughout the day is not a wise procedure. It lessens the

resisting power of the intestine to chills and acts indeed as a kind of abdominal poultice which does no good and may do harm.

The following figures have been furnished me as regards the prevalence of dysentery in the Port Louis District :—

Statistics.

Cases admitted to Civil Hospital

1916	1917	1918	1919	1920
Not available		125	119	76

Cases treated at Central Dispensary

1916	1917	1918	1919	1920
33	115	89	160	36

Cases treated at Eastern Dispensary

1916	1917	1918	1919	1920
...	...	...	43	33

Dysentery should be notifiable.

In my 28/R/7 of 16.4.21 I asked that dysentery, i.e. the condition in which the stools contain both blood and mucus, be made a notifiable disease in Mauritius. It is important to determine accurately its incidence and when the Medical and Health Department is re-organised it should be possible to follow up notification by efficient prophylaxis and treatment.

Filariasis

5. Filariasis.—In my report on Port Louis I pointed out that the presence of *Culex fatigans* in Port Louis could not be ignored and the truth of this statement, so far as filarial disease is concerned, is apparent from the annexed return.

Statistics

Cases of Filariasis and Elephantiasis treated in the Civil Hospital, Port Louis. Infection apparently locally acquired :—

1916	1917	1918	1919	1920
Not available		12	10	13

Cases treated at the Central Dispensary.

1916	1917	1918	1919	1920
4	14	6	...	1

Cases treated at the Eastern Dispensary.

1916	1917	1918	1919	1920
...	...	...	2	1

Meaning of term "enterica."

6. Enterica.—This is an Army term including not only enteric or typhoid fever but the closely related paratyphoid infections of which three types have been distinguished and classed as A.,B.,C., Of these A. and B. are the more important and Dr. Barbeau informs me that Paratyphoid A is the form most frequently encountered. It is to be feared that the incidence of "enterica" in Port Louis has not been determined with any accuracy. Local facilities for its bacteriological diagnosis are quite inadequate.

Value of blood culture.

Blood culture should be carried out on all doubtful cases but, with the laboratory at Réduit and considering the smallness of the Staff at the Civil Hospital, Port Louis, it is hopeless to expect that the method be systematically practised.

Such figures as are available are presented :—

Cases of Enteric Fever admitted to Civil Hospital.

1916	1917	1918	1919	1920
Not available		14	6	10

Cases notified in Port Louis District.

1916	1917	1918	1919	1920
27	37	25	19	26

To facilitate diagnosis, both in hospital and in private practice recourse should be had to the simple and most efficient "Atropine Test" introduced by Marris during the recent war. It is a clinical test for typhoid fever, to be applied by the physician at the bedside, and, if it were universally employed, would quickly prove of great value from a clinical, statistical and preventive standpoint. A clinical test for typhoid fever.

Details of the test will be found in the new edition of Manson's "Tropical Diseases" edited by Dr. Manson-Bahr.

The causes of "Enterica" may be stated in alliterative form. Causes of "enterica"

They are careless "carriers," contact cases (chiefly cooks), drains, dairies, dirty drinking water, sewage-fed shellfish, the dust of dried dejecta and the repulsive regurgitations, dangerous droppings and filthy feet of faecal-feeding flies fouling food.

It is not easy to determine which of the above are the main factors determining the prevalence of "Enterica" in the Port Louis District. The necessary data are not available. No careful investigation of the matter, supported by bacteriological evidence, has ever been made. All I would care to say is that milk can probably be, to a large extent, excluded owing to the fact that it is nearly always boiled before consumption, and that there are some grounds for supposing that a polluted water supply must play a very considerable part in producing the disease.

The same measures as are necessary to get rid of dysentery are required for the extermination of "Enterica." In addition, we possess in preventive inoculation with triple vaccine a valuable means of protection from infection. Elsewhere in Mauritius anti-typhoid inoculation is practised with success but for various reasons it is not much in force in Port Louis. Valuable though it is, it constitutes a confession of weakness, an acknowledgment of failure in sanitation. It should, in times of peace and amongst a civilian population, be merely an auxiliary method instead of usurping first place in the line of defence. Prophylaxis. Inoculation.

If the steps advocated in my Report on the Sanitation of Port Louis be carried into effect we may expect to see a marked diminution in the number of cases of "Enterica," the continued presence of which is a reproach to the administration.

7. Influenza.—Port Louis and the Colony generally have so recently been visited by a terrible epidemic of this disease, and the causes of its spread and severity are so well understood, that I need say little regarding it. Sporadic cases still occur in the Port Louis District and there is always a risk that climatic or other conditions, of which as yet we know little, may cause it to assume epidemic prevalence. In all probability the great epidemic was due to a special strain of the causative organism, or possibly to the combined action of several species of bacteria, for the point is not yet settled as to whether *Bacillus influenzae* was alone to blame for the world-wide pandemic, whether it acted in symbiosis with streptococci and other organisms or whether the real cause was not some filter-passing organism still requiriug complete investigation. It need here only be noted that persons debilitated by malaria, ankylostomiasis, beri-beri and insufficient food fall ready victims to influenza as do those ill-clad and housed under the conditions obtaining in many parts of Port Louis. The great epidemic. Danger of recurrence. Causative agent.

The following figures are available regarding the disease:— Statistics.

Cases from Port Louis District admitted to Civil Hospital.

1916	1917	1918	1919	1920
Not available		353	1335	554

Cases treated at Central Dispensary.

1916	1917	1918	1919	1920
1025	917	468	1218	370

Cases treated at Eastern Dispensary.

1916	1917	1918	1919	1920
...	...	...	2281	1491

Prophylaxis.

The usual preventive measures are well known and need not be detailed though possibly the prophylactic value of warm clothing is not sufficiently recognised; but influenza will never be properly fought in Port Louis until it is possible to carry medical aid into the homes of the poor who are unable to pay for medical attendance and who will not or cannot receive hospital treatment. Attention may be directed to a new prophylactic measure which in the hands of Dr. J. A. Taylor, the Senior Medical Officer of the Uganda Protectorate, has yielded very good results.

New prophylactic measure for influenza.

It consists in adding together equal parts of ordinary tincture of iodine (B.P.) and native honey. Two or three drops of this mixture are placed on the tongue of contacts at least every 3 hours throughout the day.

Dr. Taylor vouches for the efficacy of the application and the method is so cheap and simple that it would certainly seem to merit a trial in Mauritius. The great thing is to use the remedy regularly and with sufficient frequency.

8. LEPROSY.—The subject of leprosy, and more especially of the provision of a new leper hospital conducted on modern lines, was dealt with in my 35/R/12 of 11.4.11. (Appendix II.) A Chapter in Anderson's "Epidemics of Mauritius" furnishes information regarding leprosy in Port Louis and one gathers that the disease is more common than is generally supposed.

Leprosy should be notifiable.

Leprosy should certainly be made a notifiable disease as recommended in my No. 28/R/7. That it is contagious admits of no doubt. In this connection I would direct special attention to the recent report of the Conference of Leper Asylum Superintendents and others on the Leper Problem in India, 1920. The Conference adopted unanimously the findings of the Special Medical Sub-Committee, the more important of which are as follows:—

Report of Indian Conference.

"i. Leprosy is contagious, but slowly, with a long incubation period, through the escape of the causative bacillus in the nasal discharges of the majority of cases, which include many early cases having no outwardly visible ulceration, and to a less extent from open sores.

ii. The disease is not directly hereditary, children being free from actual infection at birth, but they are specially susceptible to contagion from an early age, children as a class being more susceptible than adults. These facts necessitate the earliest possible separation of infants and children from infected leper parents.

iii. In view of the preceding opinions segregation is the most effective measure for reducing the prevalence of leprosy, and the grave danger to the community of unrestricted association with lepers.

iv. The Committee recommend that steps be taken to provide facilities for the training of Medical Assistants in the diagnosis and in the treatment of leprosy to enable the best methods to be more generally used in asylums, and also in hospitals and dispensaries, as the majority of the more amenable earlier cases will for a long time to come be most easily and economically dealt with in the latter institutions. Leper institutions should be provided with facilities for microscopical examinations.

v. The Committee are of opinion that, in view of the considerable degree of fecundity of lepers, especially of females, and the excessive danger of contagion to the children of lepers, which play a great part in maintaining the prevalence of the disease, the separation of sexes is desirable as far as possible. Whenever this is not found to be practicable married lepers should only be allowed to live together on the express understanding that any children born to them shall be separated from their infected parents at the earliest possible age. The committee also consider that it is especially desirable to separate patients presenting good prospects of recovery under efficient treatment to eliminate the risk of the healthy mate becoming infected while the partner is undergoing treatment.

vi. The method of treatment with the salts of fatty acids introduced by Lt.-Col. Sir Leonard Rogers, I.M.S., has been lately tested by fourteen medical officers and assistants in leper asylums throughtout India with most favourable results, 72 per cent. showing marked improvement in spite of the fact that most of the cases were advanced and the period of treatment had been comparatively short. More research is needed, however, further to improve the treatment. In view of the international importance of research in connection with leprosy carried on in India, an application should be made to the International Health Commission for a grant towards this work."

Other sections of the report state that:

"1. The conference consider that legislation should be primarily concerned with pauper lepers, as these are the greatest menace to public health.

2. As far as possible, segregation should be of a voluntary character as is now carried out in the asylums of the Mission to Lepers, except as is hereinafter recommended in the case of pauper lepers under the Act.

3. We further consider that where the compulsory segregation of large numbers of pauper lepers becomes necessary this might be brought about by the establishment of suitable settlements for the care of this class of people.

4. The Conference recommend that great care be observed in the selection of sites for new asylums and in the arrangements for water supply and drainage, and that, where necessary, expert advice should be obtained; also that it is desirable and economical to erect buildings of substantial construction and of approved type according to local requirements.

5. In conclusion, it is the opinion of the Conference that the disease of leprosy could be stamped out in India if all lepers were segregated, but, as this does not appear to be practicable at this time, it strongly urges that the first step to be taken in this direction is the segregation of all pauper lepers."

My own experience, such as it is, leads me to agree with these conclusions which are of great importance at the present time in respect of Mauritius where an effort is at last being made to cope properly with the leper problem.

Methods of treatment.

I have already stated that I think the best hope for amelioration and cure is to be found in the injection of the ethyl esters of chaulmoogra oil on the lines adopted in Hawaii, but the methods introduced by Sir Leonard Rogers in India should also be given a trial and everything should be done to mitigate the hard lot of those who have become the unfortunate victims of this disease.

The returns as regards leprosy are as follows:—

Statistics.

Cases treated in Civil Hospital, Port Louis

1916	1917	1918	1919	1920
Not available		0	2	0

Apparently no cases were seen at either of the Dispensaries.

Leprosy is certainly far more common than here indicated. In 1887 there were 709 lepers in Mauritius. It is unlikely that the number has diminished. In all probability it has increased.

Rat leprosy in Port Louis.

Since writing the memorandum to which reference is made I have been told that the condition known as rat leprosy exists in Port Louis. This peculiar disease of rats requires further investigation. Its precise relationship to human leprosy if any exists, has never been accurately determined. This constitutes a line of work which a research student might profitably pursue in Mauritius.

8. Malaria.—As this disease was given special prominence in my published report I content myself with submitting the statistics which have been furnished me but which cannot be regarded as having much value. In any case many of them must represent relapses, not fresh infections:—

Statistics.

Cases treated at Civil Hospital, Port Louis

1916	1917	1918	1919	1920
Not available		641	686	416

Cases treated at Central Dispensary

1916	1917	1918	1919	1920
1620	2270	2290	4659	1322

Cases treated at the Eastern Dispensary

1916	1917	1918	1919	1920
...	...	...	2001	1486

Utilisation of larvæ of *Culex tigripes*.

With reference to preventive measures some interesting and suggestive observations have recently been made. The cannabilistic habits of a species of mosquito *Culex tigripes*, first discovered by Messrs. Daruty de Grandpré and d'Emmerez de Charmoy, and which occurs in the upper part of the Tranquebar Valley and on Monneron Hill, have long been known. In my trap pool experiments, however, I noted that they appeared to have a special predilection for the larvæ of *Anopheles costalis*. When *Culex tigripes* larvæ were present in the tubs the anopheline larvæ were never found.

I studied their habits *in vitro* and found that the same thing occurred. Major Casement D.S.O., R.A.M.C., then kindly undertook further investigations and confirmed the findings.

Ross in his report suggested the importation of A. *rossii* larvæ from India as enemies of anopheline larvæ. Nothing was done in this direction but one is inclined to ask: "Are not Abana and Pharpar, rivers of Damascus, better than all the waters of Israel"! In other words have we not here, in Mauritius, a voracious mosquito larva which can perhaps be utilised to some extent in the campaign against anophelines. So far as is known *Culex tigripes* is harmless as far as the conveyance of disease to man is concerned. In fact it appears that it very rarely, if ever, bites man, (Ross and Fowler). Thus it is unlikely to be a transmitter of filariasis and so, in all probability, may be propagated with safety. I propose, with the kind assistance of Major Casement and Dr. Castel, to carry out experiments on a larger scale to see if the tigripes larvæ will prove effective in destroying the broods of *A. costalis* in places where *C. tigripes* does not naturally exist. The latter is largely a forest mosquito and may not take kindly to other surroundings. Morever it may be found to thrive only under certain climatic conditions. All this must form the subject of research. There is no use saying more at present but the investigation is well worth conducting and will be reported upon at a later date. Since writing the above I have received from Mr. D'Emmerez de Charmoy a copy of his report to the Malaria Enquiry Committee, 1901-1902. It is of interest to note that so long ago as 1902 the well-known Mauritius Entomologist carried out some laboratory experiments as regards the effect of *C. tigripes* larvæ on those of anophelines. In his report he makes some interesting remarks on the use of "natural" enemies which must be borne in mind. Indeed Major Casement and I have already found that the larvæ of *Culex tigripes* are not effective in places where anopheline larvæ and "millions" coexist. The fish, which cannot get at the anopheline larvæ on account of green algae, destroy the *C. tigripes* larvæ.

Case of human plague in Port Louis.

9. PLAGUE.—Since completing my report on Port Louis one case of human bubonic plague has occured. It was fatal and indeed the diagnosis was only made after death. The case was a peculiar one in several respects and had the man not died, in all probability no one would have known that human plague was present in Port Louis. A consideration of this case engenders the uncomfortable thought that when rat plague is prevalent in the town it is possible that human cases occur which never come under medical notice.

Concealment of plague cases.

A section of the populace is always ready to conceal cases of plague and in any case, at the beginning of an outbreak, diagnosis is apt to be difficult.

Although the epidemic continues in rats no second case of human plague has been notified.* See however note at foot of next page, In one sense this is gratifying but it tends to make one suspicious, though it is possibly true that we have to do with an attenuated form of *B. pestis* which, while it kills a certain number of rats, is not, generally speaking, pathogenic to man.

Possibility of outbreak.

The plague case above mentioned and on which an autopsy was performed, died, in my opinion, from an intercurrent disease, not from plague. He was infected with plague but it did not kill him. Some confirmation of this view is found in the fact that, save in the case of the lungs, the organs did not present the typical appearances found in plague and that the number of *B. pestis* present in the spleen, glands, &c., was remarkably small. Still there is no doubt the organism was *B. pestis*. It was fully investigated by Dr. Barbeau who applied both cultural and biological tests.

It is unfortunately possible that successive passage of *B. pestis* through rats may heighten its virulence so that eventually it may give rise to an outbreak of human plague. Indeed outbreaks of human plague only occur after the disease has reached a certain intensity in rats.

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*Unfortunately since the above was written several cases of bubonic plague, one of them fatal have occurred in the camp occupied by Indian labourers in the employ of the Mauritius Dock Company.

At any rate one cannot view with an easy mind the continuance of rat plague in Port Louis. Energetic methods of rat destruction are being prosecuted and a fresh supply of prophylactic serum had already been obtained but further measures are required. In reporting on PortLouis mention was made of the necessity of erecting rat-proof shops and godowns and for removing wholesale grain stores from the crowded parts of the town. The association of grain and rats is a very close one and nothing radical can be done until these wholesale grain stores are cleared out. This has formed the subject of a special memorandum. (My 128/R/48 of 16. 6. 21). Furthermore the suggestion has been made that copies of the U.S.A. Public Health Report, 1920, which furnishes information regarding rat surveys and rat-proofing should be procured.

Preventive measures.

It is a very useful and well illustrated document and contains the provisions of a Model Ordinance designed to regulate Building with reference to rat proofing.

It would be well if a rat-proof government grain store were built within the Customs yard. All grain landed from ships would be stored here and the premises would be subjected to periodical deratisation by means of Clayton fumigation or hydrocyanic acid gas.

Government grain store.

From a medical point of view Port Louis is fortunate in possessing no quays or wharves to which ocean-going ships can tie up. Still there is a Dry Dock and here I have seen a vessel without any rat guards on her hawsers. This should not be permitted. Every care should be taken to prevent rats getting ashore from ships, special attention being paid to sailing vessels, some of which trade with Madagascar. Moreover precautions should be adopted to prevent these vessels conveying plague rats to other ports of the Island, notably Souillac where they tie up to a wharf.

Precautions as regards shipping.

Small sailing ships should be breasted off the quay to a distance of 4 feet, their gangways should be hove up at night and rat guards should be placed on their hawsers. If proper rat guards are not available tarred canvas can be used covering the cable for a distance of 3 feet. If gangways cannot be hove up or drawn on board at night they should be illuminated and if possible a watchman should be appointed to prevent rats boarding or leaving the ship. Trapping should also be carried out on board these vessels. This has been arranged. If vessels lying out in the harbour have to unload into lighters at night it would be a good thing to insist on the ship exhibiting a bright light overside. This has been found to be a good rat deterrent. The lighters require frequent inspections and so does cargo, especially grain, after transmission ashore. Plague has already been reported upon (My 32/R/10 of 29.4.21) so it only remains to present a few statistics regarding it and some interesting figures furnished by Dr. Keisler showing, in some measure, the influence of persistent and systematic trapping on a large scale.

Apart from the case above mentioned there were until recently no notifications of plague in the Port Louis District since 1915. In 1917, eight cases occured in the country districts.

Statistics.

Dr. Keisler's statistics are as follows :—

Year	No. of plague rats	No. of plague cases	No. of deaths
1912	629	442	372
1913	877	194	157
1914	960	68	63
1915	480	8	7
1916	138	0	0
1917	51	0	0
1918 (up to 9.10.18)	4	0	0

I recommended that the rat catchers be inoculated with plague prophylactic and this has been done. It was also offered to those who has been in contact with the case of human plague and was not accepted by any of them. The Medical and Health Department consider it inadvisable to make inoculation compulsory at present. I agree. †

Preventive inoculation.

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†The small outbreak of plague mentioned on p. 7 and which has no connection with the first, fatal case necessitates more stringent action. All contacts are to be inoculated and so are all the employees of the Mauritius Dock Company. This may serve, in some measure to limit the spread of the disease and to mitigate its severity in those attacked. Various other precautions are also being taken, the most important being complete evacuation of the infected area.

NOTE.—There have been 12 cases in all with 9 deaths, the last being reported on July 14th.

10. PNEUMONIA.—A great deal of what has been said about influenza applies equally to pneumonia. It is now recognized that it is a communicable disease and is to be treated as such. In Mauritius, it appears, at least at present, usually to follow influenza but it should not be forgotten that there is a form of pneumonia which accompanies malaria and is amenable to quinine.

Malarial pneumonia.

From what I have seen of pneumonia in other tropical countries I am persuaded that a great deal of it, at least amongst the labouring classes, is due to inefficient clothing. In Port Louis the poorer classes of Indian especially wear the same thin and flimsy garments during the cooler period of the year as they do during the hot season. This is not an easy fault to remedy but I believe it would pay employers to look into the matter and during the winter at least to supply warm jerseys to their men when the latter cease work in the evening. The following figures have been furnished me regarding the incidence of pneumonia. The Central Dispensary figures are very small :—

Value of warm clothing.

Cases treated in Civil Hospital, Port Louis

1916	1917	1918	1919	1920
Not available		63	61	189

Cases treated at Central Dispensary

1916	1917	1918	1919	1920
3	4	2	3	4

Cases treated at Eastern Dispensary

1916	1917	1918	1919	1920
...	...	...	38	22

11. PUERPERAL FEVER.—Considering the conditions under which child-birth takes place in Port Louis, the amount of puerperal fever is surprisingly small. The cases admitted to hospital from the Port Louis District are as follows :—

Incidence.

1916	1917	1918	1919	1920
Not available		8	4	1

The cases notified to the Medical and Health Department were

1916	1917	1918	1919	1920
...	...	10	4	7

Question of immunity.

One is inclined to ask if there is not a certain racial immunity and if the ease with which parturition is usually accomplished in the coloured races does not militate against the production of points of entry for the causative organisms.

Maternity and infant welfare work.

Possibly, however, the disease is more common than is generally recognized and it is unlikely that its incidence will be correctly gauged until a Maternity Centre has been formed and infant welfare has become the subject of systematic propaganda.

12. SCHISTOSOMIASIS.—This condition, formerly and perhaps better known as Bilharziasis, has received mention in my former report, where it was stated that in the last three years 41 cases had been treated in the Civil Hospital, Port Louis. In all probability the number of persons infected with the trematode worms causing the disease is considerably larger, for in its milder forms it does not produce much inconvenience and its characteristic symptom, bloody urine, is not always in evidence. Yet mild cases are a source of danger to the community for, like severe cases, they void eggs which in water develop into ciliated embryos. These pass to certain snail hosts and after development in them the so-called cercariæ are discharged from the snails and, within a period of 48 hours can infect man, directly through the skin or mucous membranes.

Incidence.

Method of infection.

Severe schistosomiasis is a crippling disease and during its course various complications may arise.

Preventive measures.

I have already mentioned how drinking water can be rendered safe by storage but it is worth noting that ducks have been found useful as they destroy the snail hosts. Ducks are common in Mauritius and should be encouraged and placed on waters known to be dangerous. Water used for bathing purposes can be rendered safe by the addition of cresol 1 in 10,000.

13. Skin Diseases.—These need merely be mentioned. Scabies is common. As regards other conditions favus and impetigo are frequently encountered but ring-worm is not much in evidence. The chigger flea has been introduced and has now, and again caused trouble but Dr. Momplé informs me that chigger infection does not spread. Probably the soil is unfavourable. Prevalence of skin affections.

The question of skin diseases in school children is one of considerable importance. I notice that in no government or aided school are there any proper facilities for washing nor are there any cloakrooms. The conditions in these schools certainly favour the spread of any cutaneous disorders which may be present. School conditions in relation to spread of skin diseases.

The possibility of skin diseases being transmitted in hairdressers' shops has formed the subject of a special memorandum (My 116/R/45 of 7. 6. 21).

14. Tuberculosis.—This, unfortunately, is much in evidence in Port Louis. There can be no doubt that the defective housing conditions are chiefly to blame for its transmission and prevalence. Doubtless also alcoholism plays a part. Among Indians and Creoles drunkenness is common and a drunk man is a careless man ; careless of his health, of his surroundings, of his diet, of his money. Hence the alcoholic often falls an easy prey to the bacillus of Koch. Pulmonary tuberculosis is much the more common form, a fact confirmatory of the view that it is to a polluted atmosphere and not to contaminated food that the source of infection is to be referred. Poverty and poor food are, however, contributory causes in Port Louis elsewhere. A considerable proportion of the population lives from hand to mouth, is not far removed from the boundary line that separates the semi-starved from the fairly fed, and very little may suffice to place it in a condition where its natural resistance is lowered. Causes of Phthisis.

Very interesting work has recently been done in connection with tuberculosis amongst coloured races both in the United States and in the tropics. It is not here necessary, however, to enter into the questions of heredity, of racial susceptibility, of immune and non-immune populations.

In Mauritius non-immunes are probably non-existent. The conditions approximate to those met with in the Southern States of the American Republic which have formed the subject of special study, and regarding which a valuable volume has recently been published. Question of immunity.

The Director, Medical and Health Department has kindly provided me with the following figures as regards pulmonary tuberculosis in Port Louis :— Statistics.

Cases from Port Louis District admitted to Civil Hospital.

1916	1917	1918	1919	1920
—	—	—	—	—
Not available		131	94	118

Cases treated at Central Dispensary.

1916	1917	1918	1919	1920
—	—	—	—	—
111	80	30	15	5

Cases treated at Eastern Dispensary.

1916	1917	1918	1919	1920
—	—	—	—	—
...	..	...	16	188

I find that there has been much correspondence on the subject of an anti-tuberculosis campaign and happily in this instance something definite is being accomplished for special tuberculosis wards are in course of erection at the Civil Hospital. So far, so good. Such a measure not only brings relief to the sufferer but isolates a number of the more advanced cases who are specially apt to infect others. Tuberculosis wards at Civil Hospital.

This, however, does not deal with the root of the trouble. It is necessary to get rid of the slums, to place restrictions upon drink, to improve the food and clothing of the lower classes, to fight destitution, to disseminate information and to treat early cases. Such a programme is by no means easy to carry into effect. It is hoped that a serious effort will be made to improve housing conditions and to deal with the drink traffic but poverty and poor food are dependent on social conditions which are often difficult to remedy. Something has been done in the way of directing attention to the danger of promiscuous expectoration but it is necessary to educate the individual sufferer and I do not know how this is to be accomplished without the aid of a Tuberculosis Dispensary which will, at the same time, extend help to the early case. General prophylaxis.

I note that a large file has accumulated on this important question and useful reports have been obtained from Ceylon and Trinidad.

Report by Dr. Rouget.

At the request of H. E. the Governor, Dr. Rouget submitted an excellent and well reasoned report on the subject, at the conclusion of which he says :

"I believe a good deal may be done towards the attainment of the object aimed at by the following measures :—

"(1) The erection of special Tuberculosis pavilions in connection with the general hospitals. Here, while undergoing treatment, the patient may be taught how to protect himself and to protect members of his family. Such tuberculosis wards, to be instituted in each district, will stand as subtitutes to a Central Sanatorium. The latter institution would, in my opinion, be a failure in Mauritius. From my experience of the people of this place, I have no doubt that very few tuberculosis patients would be prevailed upon to accept admittance for any length of time to an Establishment which, however attractive, would be far from their homes and where they would not be readily visited by their relatives and friends.

"(2) The re-organisation of ordinary dispensary work on more efficient lines than presently obtain. The number of general dispensaries should be increased and provisions should be made therein for regular domiciliary visits with a view not only to ensure treatment at home of patients not absolutely requiring hospitalisation, but also, in the case of tuberculous patients in particular, to investigation as to the sanitary condition of the dwelling, and to disinfection instruction and relief according to necessity.

"In a word as a first step towards the establishment of the Special Tuberculosis Dispensary, some of the functions of the latter should, I submit, be extended to the General Dispensary.

"Such a course, if carried out in earnest, will, I believe, gradually win the confidence of the public and will pave the way for the more radical measures to be subsequently enforced by the Special Dispensary System and for the compulsory notification of Tuberculosis which is to be the necessary outcome of the scheme."

Central Sanatorium unlikely to prove a success.

From what I have seen and heard in Mauritius I agree that a Central Sanatorium is not likely to prove successful, at least at the present time, and that Dr. Rouget's scheme for tuberculosis pavilions attached to existing hospitals has much to commend it. As stated a start in this direction has been made in Port Louis. That the ordinary dispensaries require re-organisation, and that regular domiciliary visits are very necessary cannot be doubted. Indeed this matter has already formed the subject of a special memorandum, (My 80/R/35 of 17.5.21. M.P. 2011/21) in which I have put forward a scheme for increasing the number of medical officers and rendering the medical service more efficient. Steps are now being taken to carry out the recommendations made.

Increase in number of dispensary medical officers.

Dr. Rouget's views as regards a special Tuberculosis Dispensary.

The only point on which I do not find myself in complete accord with Dr. Rouget is as regards his attitude towards the immediate establishment of a Tuberculosis Dispensary. What Dr. Rouget says on this subject is perfectly sound. I quote from his report as follows :

"(1) The importance of the part played by properly organised dispensaries in an anti-tuberculosis compaign being now universally recognised and the benefit of the scheme having been fully proved by long experience in other parts of the world, I see no reason why an organisation established on similar lines should not, on principle give equally satisfactory results in Mauritius.

"(2) The consensus of opinion among the most competent authorities on this question is that ' The Tuberculosis Dispensary is the pivot upon which the scheme of detection, prevention and treatment must revolve. It is the receiving-house and clearing-house for all cases of Tuberculosis within the District, acting as a centre of observation and diagnosis and in connection therewith the patients will be able to obtain curative treatment at the dispensary or from the dispensary at their homes, together with such institutional treatment elsewhere as may be required. The dispensary is the first unit of the administration, working in close unison with the second unit,-the Sanatorium or other institition.' (Interim report of the Departmental (Tuberculosis) Committee.)

"(3) It results from the above *exposé* that, unless the Tuberculosis Dispensary be organised on a thoroughly efficient footing

so as to attain completely the object referred to above, it is absolutely useless. Half measures in this respect will be of no avail.

" (4) The purport of the Tuberculosis Dispensary, should, therefore be well understood before the carrying out of the plan. Its scope covers a wide field and its success and strength will depend not only on the thoroughness of its internal organisation and on the closeness of its relationship with other institutions concerned in the prevention and treatment of Tuberculosis, to use the words of Sir R. W. Philip, one of the originators of the scheme, but also, to a large extent, on the strong support and co-operation of the public.

" (5) Now, when we come to examine how far, in practice, such an extensive scheme can be applied to the conditions existing in Mauritius, we are faced with serious difficulties. It strikes me for instance, that to achieve the aim of the Tuberculosis Dispensary at least three conditions will have to be satisfied :

" (*a*) The State must be prepared to meet, financially or otherwise, all the obligations which such a far reaching plan necessarily brings with it.

"(*b*)The hearty co-operation of all Medical Practitioners, whether or not in the service of Government, must be ensured.

"(*c*) The scheme, to be successful, should, above all find a public convinced of its beneficial object and prepared to accept with confidence the measures it enforces.

" (6) The obligations imposed on the Government will be considerable if the special dispensary be at all to be run, as it should, on the lines universally adopted. Such an organisation will, according to the programme followed by a model of the kind, viz. the Victoria Dispensary for consumption, Edinburgh, include among its functions :-

"(*a*) The reception, examination and selection of patients. The diagnosis to be confirmed in every case by bacteriological examination of the expectoration, &c.

" A.—A small laboratory will have to be attached to the Dispensary for that purpose.

" B.—A complete record of every case to be kept.

" C.—Cases to be divided into three categories and dealt with accordingly :—

i. Cases requiring hospital treatment.
ii. Cases receiving indoor treatment.
iii. Outdoor cases treated at the Dispensary.

" (*b*) Visitation of patients at their own houses by (a) a qualified practitioner and (b) a specially qualified warder or nurse for the double purpose (i) of treatment and (ii) of investigation into the state of the dwelling and general conditions of life and the risk of infection to others. (c) Provision for the treatment of patients including food and suitable dwelling.

" (*c*) Instructions to patients, their families and their friends on the treatment and mode of propagation of Tuberculosis and the means to minimise the risks of infection.

" (*d*) Provision for relief to be granted to the families of patients who are the bread-winners.

" (7) Such measures will necessitate the erection and fitting up of a suitable building, the appointment of an appropriate staff of medical men, nurses, warders, clerks and servants and provision for the issue of medicines, disinfectants and stores.

" The execution of this plan depends I need hardly say on pure financial considerations to be settled by Government.

" (8) The second condition will raise no difficulty whatever, for I have not the least doubt that the whole medical profession will give to the scheme their hearty support and will do everything in their power to contribute to its success.

" (9) The real difficulty lies with the very people the scheme is intended to benefit. Here three great obstacles have to be overcome, viz. : pauperism, alcoholism and ignorance, all operating in a vicious circle and constituting important factors largely responsible for the propagation of Tuberculosis. The Dispensary organisation, however

perfect, is, in my opinion, doomed to complete failure, so long as these three problems have not been satisfactorily solved.

"(10) The question of the better housing of the poor and working classes and that of the stamping out of alcoholism should, I submit, be taken in hand before full developement be given to the special tuberculosis scheme, as it would be impossible to carry out its different measures among people debilitated by malaria, demoralized by alcoholic habits, living in insanitary dwellings on scanty and improper food and professing a deep rooted scepticism and fatalism inherent to their condition

"(11) For these reasons, therefore, though a firm believer in the prominence of the rôle of the Tuberculosis Dispensary in the fight against Tuberculosis, I am of opinion that the enforcement of the full scheme in Mauritius should be postponed until the masses are better prepared by some improvement in their conditions of life and surroundings to confidently accept its teaching and submit to its necessities."

Danger of delay.

Where I differ from Dr. Rouget is that I think if we are to wait until the progress he outlines is made, valuable time will be lost. It seems to me that in Maurituis, generally, there has been a marked tendency to adopt an Asquithian policy of "wait and see" with reference to questions affecting the health and well-being of the population, with what result is only too apparent. I advocate the establishment of a Tuberculosis Dispensary, not because I think it will carry out all that it should accomplish. but because I look upon it as a most useful method of distributing that information on which Dr. Rouget rightly lays such stress. Everything must have a beginning and a Tuberculosis Dispensary on a small scale will I believe prove itself of undoubted value. There should be no difficulty in establishing a building where outdoor patients can receive treatment and advice and where the necessary microscopic work can be conducted. The laboratory of which Dr. Rouget speaks is scarcely necessary, A good microscope and a small equipment is all that is required, in fact merely clinical microscopy which necessitates no great expenditure. A single medical officer, with clerical help and with one or two assistants who can easily be trained to examine for and recognise the tubercle bacilli in sputum, will suffice for a start. Gradually the scheme can be built up until the Dispensary functions fully on the lines Dr. Rouget indicates. The Medical Officer will act more as an apostle of hygiene than as a clinician. He will instruct and he will collect useful data He will select the dangerous cases for hospital isolation and he will treat the outdoor cases of which Dr. Rouget speaks.

Educational value of a Tuberculosis Dispensary.

Clinical microscopy.

Duties of Medical Officer.

Unless at the same time there seemed a possibility of active sanitary work being undertaken in Port Louis I would not advocate the scheme but I am assured that serious consideration is to be accorded the measures I have outlined, and therefore there is some hope of improving the housing conditions, even though it may be a considerable time before relief can be carried to the tuberculous in their own homes. I feel that the statement "half measures will be of no avail" is too strong. Indeed I fail to see how the tuberculosis wards at the Civil Hospital are going to fulfil what is expected of them unless a Tuberculosis Dispensary is associated with them for there is too much other work to be done at the ordinary dispensaries to enable special attention to be paid to tuberculous cases. Hence in the scheme I have submitted as regards the introduction of Dispensary Medical Officers from India I have asked that one should be ear-marked for work in connection with the embryo Tuberculosis Dispensary which I am of opinion should be established without delay.

In connection with the general tuberculosis campaign in Mauritius I think that help might possibly be obtained from that remarkable organisation, the International Health Board which has already done so much for humanity. This Board, not long ago established a Commission for the Prevention of Tuberculosis in France and the work is carried out under four main Departments :—

Possibility of help from the International Health Board.

(a) Medical, which operates model dispensaries for the demonstration of working methods.

(b) A Department of Extension which organizes and equips dispensaries in various parts of the country.

(c) Nursing, which maintains training schools for public health visitors and supervises their work.

(d) Education, which organizes exhibitions, holds meetings and distributes literature. It makes use of the cinematograph as an agent in its propaganda.

Organisation of Commission in France for the prevention of tuberculosis.

Aid is much more likely to be afforded by the Board if it finds that something tangible has been done locally. It works on the principle of helping those who are prepared to help themselves in some measure.

Hence if Mauritius is able to point to a special tuberculosis dispensary and tuberculosis hospital wards in Port Louis any application which may be made will, in all probability, receive a sympathetic response. Another institution with which it would be well to get into touch is the League of the Red Cross Societies at Geneva. This League has Departments of Tuberculosis and of Communicable Diseases and readily supplies information on these and many other questions having a bearing on health work.

League of Red Cross Societies.

15. Venereal Diseases.—Here are the available statistics regarding the most important of these social maladies, i.e. syphilis :—

Cases admitted into Civil Hospital from Port Louis District.

1916	1917	1918	1919	1920
—	—	—	—	—
Not available		102	99	233

In the case of the dispensaries the returns given me are for "Veneral Complaints" and are as follows :—

Cases treated at Central Dispensary.

1916	1917	1918	1919	1920
—	—	—	—	—
16	22	26	10	1(?)

Cases treated at Eastern Dispensary

1916	1917	1918	1919	1920
—	—	—	—	—
...	...	...	27	44

The prevalence of syphilis, but faintly indicated by the above figures, is greatly to be deplored but it is not surprising when one reflects that no preventive measures of any kind are in force. The Police have power to deal with prostitutes, not as prostitutes, but as vagrants. Otherwise these poor women are free to ply their trade without let or hindrance. I am credibly informed that boatloads of them are in the habit of visiting the ships in the harbour at night, to be bundled unceremoniously overside in the early morning.

Prevalence of syphilis.

Prostitution in Port Louis.

They must carry disease and death with them and the Police, I am told can do little for lack of a launch. The matter is a very serious one and the Police should certainly be furnished with some facilities for putting a stop to so disgraceful a traffic.

This, however, is after all a minor matter compared with the state of the brothels and the general conditions under which prostitution is practised in Port Louis. Disease is rampant and, together with alcoholism, must be sapping the vitality of the population. Recent research has shown the far-reaching evil effects of the syphilitic virus. Its malign influence is apparent in all kinds of conditions which were not formerly thought to have any connection with it. Syphilis, directly or indirectly, causes many deaths and is a very serious menace to the economic life of a community.

Lack of control.

Dangers of syphilis.

Cases are treated after a fashion at the dispensaries and more thoroughly in hospital but, as a rule, it is only the more advanced cases which are dealt with in hospital wards, and in syphilis, even more so than is other diseases, the great thing is to institute early treatment. The same is true of gonorrhœa which is by no means the comparatively trivial complaint that many of the laity consider it. The sequelæ of gonorrhœa are often the cause of prolonged ill-health and not infrequently lead to a fatal issue.

Necessity for thorough treatment of syphilis.

Dangers of gonorrhœa.

Moreover both syphilis and gonorrhœa may be transmitted to innocent victims and both may be acquired apart altogether from sexual intercourse. Indeed it is under insanitary conditions, such as prevail in Port Louis, that these methods of transmission are operative. All civilised countries are now taking steps to deal properly with the social evil and it is essential that in the capital of Mauritius an effort should be made to educate and to treat at the same time. The problem is undoubtedly a difficult one but as a first step I would advocate the provision of a fully equipped Venereal Clinic under the direction of a medical officer specially trained in anti-venereal work.

A Venereal Clinic required.

In this connection I would direct attention to the Annual Report of the Chief Medical Officer 1919–20 of the Ministry of Health which contains useful information respecting Venereal Diseases Clinics and furnishes illustrations of examination and self-irrigation cubicles likely to be of service if my suggestion is adopted. The International Journal of Public Health, Vol. 2 No. 3, 1921 contains a paper on the organisation and function of such clinics.

I have asked that one of the dispensary medical officers to be obtained from India be selected to take charge of such a Clinic and be directed not only to treat cases, and especially early cases, but to deliver lectures on the subject and to prepare informative pamphlets for distribution.

Special medical officer from India.

Other measures to follow.

This should be very helpful in the first instance and later it may be possible to adopt other measures which have proved themselves of value elsewhere. I would ask that this question of a Venereal Clinic and of the necessary propaganda be very carefully considered and I hope it may receive the attention it undoubtedly deserves.

16. Worm Infections.—Ankylostomiasis and schistosomiasis have been considered. Other helminthic infections, as might be expected in such an insanitary area as the Port Louis District, are common.

Prevalence of worm infections.

Little accurate information on the subject is available. Kendrick in his report states that amongst the 28 boys in the Government Reformatory who came from the Port Louis District 21 harboured Ascaris (round worms,) 20 were infected with Trichocephalus i. e. *Trichuris trichiura* (whipworms) and one was the host of *Strongloides stercoralis*. In all probability tapeworm and thread worm infestations are common. Doubtless systematic examination of stools in the case of hospital patients would reveal a much larger worm fauna than is represented by the above. Dr. Barbeau has a considerable collection at the Bacteriological Laboratory.

Serious symptoms caused by worms.

These worm infections cannot be wholly ignored. Indeed clonorchiasis, a disease due to a liver fluke, *Clonorchis sinensis*, discovered in Mauritius in 1874 by MacGregor in a serious complaint and is associated with marked splenic enlargement. *Ascaris lumbricoides* is now regarded as a cause of debility in the tropics and may give rise to grave symptoms. A form of fever due to this species of worm has been described in India. *Strongyloides stercoralis* must cause a certain amount of intestinal irritation and even when not serious, worm infections are troublesome and indicate faulty sanitary conditions.

Danger of uncooked food.

As these are gradually improved so the infestations should diminish. It is necessary to be careful as regards the consumption of uncooked food, especially salads. If the Rockefeller Foundation conducts an active hookworm campaign in Mauritius sufferers from many other species of helminth will benefit as the treatment employed for ankylostomiasis is efficacious in expelling many other kinds of worms.

"Continued Fever" a bad term.

17. Miscellaneous.—I have asked that the condition "Continued Fever" be removed from the list of notifiable diseases. It is an antiquated term and is best described as a refuge for the destitute. It is easy to say a man is suffering from "Continued Fever" but such a diagnosis connotes no specific infection and leads to nothing practical. The microscope must be more used in Mauritius than heretofore and then "Continued Fever" will be relegated to the limbo of forgotten things. Hitherto it has been largely used as a synonym for typhoid fever which itself is notifiable.

Cerebro-spinal Fever.

Very fortunately Port Louis is free from *Cerebro-Spinal Fever*, though cases have now and again occured in the town. If ever it gained a footing, it is to be feared that, under present conditions, it would run riot and produce a state of things recalling the great influenza epidemic, for the spread of the disease, which is very fatal, is favoured by overcrowding and lack of ventilation.

I am of opinion that the Port Health Officer would do well to keep himself informed as regards the occurence of this disease in ports which are in direct and frequent communication with Port Louis and more especially in South African ports. Immunity in the past is no assurance of exemption in the future.

Regarding measles, chicken-pox and small-pox nothing need be said. The fact that goats' milk is drunk to some extent in Mauritius has led me to enquire if *Undulant (Malta) Fever*, may not exist but I can find no evidence to show that it occurs. It is a fever which is very apt to be missed and which has been found in many places where its presence was not suspected, hence it merits attention.

Malta fever apparently absent.

Infectious Jaundice.

Infectious Jaundice is another disease which is apt to be confused with bilious remittent malaria. The infection is derived from rats harbouring the parasite which is a spirochæte known as *Leptospira ictero haemorrhagiae.* Infected rats have been found in many parts of the world and rats abound in Port Louis. I thought it well to suggest to Dr. Barbeau that he should conduct an investigation to see if the rats here are carriers of the organism. So far he has not detected a case and it is possible that, owing to its isolated position, Mauritius is free from this infection.

An enquiry.

We may well hope that this is the case for, as will be evident from this report, there are already more than enough communicable diseases to tax the energy and resources of the depleted Medical and Health Department.

I have the honour to be,
Sir,
Your obedient Servant,
Andrew BALFOUR

APPENDIX I.

No. 129/R/

GOVERNMENT HOUSE,
PORT LOUIS,
June 16th, 1921.

BERI-BERI.

SIR,—On April 20th I addressed a letter to the Acting Director, Medical and Health Department, on the subject of beri-beri in Mauritius. I attach a copy of the questions I put to him and of the replies he has furnished together with a copy of his Annexure A. It appears that the outbreak of the disease has practically some to an end and the present situation seems scarcely to justify spending more time on an enquiry and report. Beri-beri is endemic in the Island and forms the subject of a chapter in Anderson's "Epidemics of Mauritius."

The cases which I have seen in the Civil Hospital, Port Louis, the Barkly Asylum and elsewhere were, I think, undoubtedly typical examples of true beri-beri but the condition is very liable to be mistaken for other forms of polyneuritis and it is more than probable, considering the prevalence of alcoholism,that alcoholic peripheral neuritis is at times confused with beri-beri.

Moreover it is well known that there is a great variety in the degree and combinations of symptoms in beri-beri and atypical cases are very apt to be diagnosed as heart disease, malarial neuritis, &c., by those unfamiliar with the vagaries of the disease or who do not carry out a careful and complete examination.

In all probability the statistics furnished possess but a limited value but Annexure A. is useful if only because it directs attention to the number of cases amongst Creoles from Rodrigues.

Dr. Komplé does not comment upon this special incidence in his letter to me but I have discussed the matter with him.

It appears that these men when in Rodrigues are accustomed to a more liberal dietary than they receive in Mauritius. It is true that in addition to the Labour Law Diet they draw pay but in all probability they send the money home and enpend very little of it on extra food.

At any rate this is what has been found to occur under similar conditions elsewhere. Moreover it is interesting to note that, when employed by the Albion Dock Company their rice ration was the highly polished Siam variety. In the case of these men the cause of the disease is almost certainly dietetic and it is more than likely that errors in dietary and possibly also in the cooking of food account in the main for the presence of beri-beri in Mauritius. In this connection Dr. Komplé's note as regards the shortage and high price of vegetables is significant. At the same time it must be admitted that the food deficiency theory does not afford a satisfactory explanation of every outbreak of the disease. Our knowledge as regards the etiology of beri-beri is still defective and there are good grounds for believing that overcrowding, filth and moisture are predisposing causes and that in some epidemics they have been the predominant factors.

Personally I think there is evidence to show that there are infective forms of polyneuritis indistinguishable for true beri-beri and which may possibly at times be associated with the food-deficiency disease.

Overcrowding, filth and moisture are only too prevalent in Mauritius and it should be noted that they are specially apparent in Port Louis and perhaps also in the district served by the Barkly Asylum, both localities in which the incidence has been high.

At the same time it is certainly advisable to take measures for preventing the importation of highly polished rice, like the Saigon rice at present in the market. If rice of this nature, deficient in specific vitamine, is easily obtainable by the lower classes it is likely to be eaten at times when there may be a shortage in other articles of diet and may then lead to beri-beri.

So far as I know there is no reason why highly milled rice should be introduced or sold in Mauritius. As already stated Big Mill Burmah Rice is safe, though the margin of safety is small. Mr. Walter tells me that ample supplies of Big Mill Burmah Rice can be obtained from Rangoon and I would therefore recommend that this rice only be introduced.

I have the honour to be,
Sir,
Your obedient Servant,
ANDREW BALFOUR.

THE HONOURABLE.
THE COLONIAL SECRETARY.

APPENDIX II.

No. 35/R/11

GOVERNMENT HOUSE,
PORT LOUIS,
22nd April, 1921.

HOSPITAL ACCOMODATION FOR LEPERS.

SIR,—I have now visited on two occasions the existing leper asylum at St. Lazare and the premises at Powder Mills where it is proposed to establish a new Leper Hospital. I have also studied the various papers, which have been submitted to me on this subject. I would now report as follows :

1. Leper Asylum at St. Lazare.

To put it quite plainly, this place is a disgrace to the Colony. The arrangements are not only unfair to the unfortunate patients, but they constitute a danger to the community.

The site is bad, the buildings are quite unsuitable for the accomodation of lepers, specially those in which the male patients are housed, the sanitary conditions are primitive to the extreme, there is no proper medical attention and the nursing, despite the devotion of those in charge, is far from being adequate.

The male patients come and go as they please, and they are permitted to fashion small brooms, from grass, which, without disinfection, are sold to the public. I need hardly point out, that an article of this kind, which may be made by a leper, whose fingers and hands are ulcerated and discharging, is very likely to be a source of danger.

I am aware that this Asylum, is not intended to be an hospital, in the strict sense of the term. It is merely a refuge for mendicant and convict lepers, and the Religious Sisters who look after it are hampered in their work, and are unable to control many of the patients to whose welfare they have devoted their lives.

While doubtless a certain amount of good has been accomplished, St. Lazare presents few of the requirements of a modern leper lazarette, and the sooner it is abolished, the better for all concerned.

2. Powder Mills is not an ideal spot for a Leper Asylum, but it possesses certain advantages and can, I think, be made suitable. It is situated six miles from Port Louis, and hence posesses a desirable degree of isolation, and yet is not too far distant from the town which, I take it, will probably furnish the greater number of its inmates.

The area has been surrounded by a high wall which secures the required privacy and will to a large extent prevent attempts at escape. A stream which formerly coursed through the grounds has been diverted, and the hollow in which it coursed, though an undesirable feature, is now dry. I understand that, even during the rains, it does not lend itself to the formation of mosquito nurseries.

The question of malaria in the neighbourhood is important and accordingly, accompanied by Dr. Castel, I carried out a careful inspection of the district.

In the first place it may be noted that there are very few dwellings in the vicinity of Powder Mills. The population is small and it would appear that human reservoirs of infection must be very limited. I searched for breeding places, especially in the grounds of the Observatory but found none. The few natives and other houses in the neighbourhood were examined for adults of *Anopheles costalis* with a negative result. This does not mean that they are not, at times, present. It would be necessary to make an extensive investigation in order to obtain definitive evidence on this point. At present I can only say, that I searched for them, in the most likely places, more especially in the underground rooms of the Observatory and several Indian houses, and saw no sign of them. There were not even remains of them in the cob-webs which, in certain places, bedecked the walls and which often yield evidence of the presence of Anophelines.

I have arranged, however, that trap pools be installed in the vicinity of Powder Mills, and this method of enquiry may yield further information. A considerable portion of the Pamplemousses District was traversed and it is remarkable how much work has been done, in reclaiming marshes, training streams, canals and drains, and in generally improving the local conditions favourable for mosquito breeding. These measures should certainly have resulted, or should soon result, in a notable diminution of malaria. I called attention, however, to one possible source of anophelines, i.e. the syphon pits

which are common in the cane fields here, and which, throughout irrigated areas, in other countries, have been found a fruitful source of nuisance.

Dr. Castel will take steps to deal with these potential breeding places and they will form the subject of a future communication, when I deal with anti-malarial measures as a separate subject.

As a result of the enquiry, limited though it has been, I do not think any objection can be taken to establishing a leper hospital at Powder Mills from the point of view of malaria prevalence. In any case, from this standpoint, it is infinitely preferable to St. Lazare.

There are three blocks of permanent stone buildings. Two of these, I believe, are already earmarked, one for use as a chapel, the other as quarters for the Sisters. The third, should, I think, function as quarters for a Medical Superintendent. At this stage it seems advisable to give some idea of the requirements of a modern leper hospital designed on the most modest lines and with every regard to strict economy.

In the first place it must be recognized that the outlook for leper patients has, during the last few years, greatly altered for the better. The work in India of Sir Leonard Rogers, who introduced treatment with the gynocardates and with sodium morrhuate and more especially perhaps, the brilliant results achieved in rawaii, by Dean and Macconald, with the ethyl esters of chaulmoogra oil have opened up a vista of hope for lepers. It is imperative that the lepers of Mauritius should be given an opportunity of profiting by these advances in the therapeutics of the disease.

Furthermore, apart from medicinal treatment, and leaving out of account altogether such expensive measures as hydrotherapy and certain forms of treatment with light rays and electricity, a great deal can be done to alleviate the sufferings of leprous patients by skilful conservative surgery on a small scale.

At St. Lazare I saw several lepers, suffering from contractures, which undoubtedly could have been greatly benefited by timely operaton, while it is possible, in many cases, to limit the spread of the disease and to avert complications.

In order to give the patients the benefit of such treatment, and in order to ensure that the newer remedies be properly and intelligently used, it is very desirable that a resident medical officer should be in charge. Hence the above suggestion.

But there is another side to this question. Lepers left to drag out a miserable existence, with no alleviation afforded them, save that obtained by local applications, good food, and shelter, are apt to be impatient of restraint. Hence, doubtless, some of the trouble of St. Lazare. On the other hand, if a leper be properly treated, and sees the improvement in his own case, and in other cases he recognizes the benefit to be derived from staying in the hospital and submitting to discipline. Furthermore, lepers living outside, as soon as they realize that there is a chance of improvement and possibility of cure for them within the walls of the leper asylum, will speedily beg for admittance. This is a very important aspect of the question for, in all probability, there are many unknown lepers in Mauritius. I have studied the history of the disease in Mauritius, as set forth in Anderson's book and in various reports, and I am convinced that leprosy must be more prevalent in the Island than is generally recognized. I need not here detail the argument leading to such belief, but I am fairly certain that, if the treatment of lepers, here, is placed on a modern basis, the number of the inmates of the leper hospital will be largely augmented. The Ordinance of 1913 only deals with vagrant, pauper and convict lepers. The disease is not notifiable, and there is little to induce lepers to enter St. Lazare. On the contrary there is much to repel any who can possibly afford to live in some sort of comfort outside. An example indeed is now to be seen in the case of a Chinaman who owns piggeries in the vicinity.

These considerations lead me to deal with the question of the premises generally and of the buildings required.

The areas is so large than a great deal of the land can be put under cultivation. This is a valuable asset for it is always desirable than a leper asylum should, as far as possible, be a land colony and self-supporting.

The area for male and female lepers and for convicts, have already been demarcated and the arrangements made appear to me suitable though, even convict lepers, should not be housed in the old prison cells. By all means, let them be confined within the yard, but put them into comfortable dwellings. The cells can be utilised in other ways.

Doubtless some of the existing buildings in the proposed male section can be turned to good account while wards will have to be built for the females.

At this stage, I do not propose to enter into particulars, for much will depend on the money and labour available and on the buildings sanctioned, for the latter must be erected with a view to convenience and facility of working.

I would only say that it is essential there should be a *small hospital* for cases *in extremis* and for lepers suffering from such communicable complications as pneumonia and dysentery, both frequent concomitants of leprosy. In this connection I may point out that there is, at St. Lazare, a leper suffering from pulmonary tuberculosis. He is of better class and occupies a separate shed, but affords an example of what has just been stated. A *mortuary and post mortem* room, are, of course, necessities.

A *small operating room* is required and attached to it a *small laboratory* where the results of treatment can be tested and where the routine microscopical and other work of the hospital can be conducted.

In addition to a *laundry and kitchen*, there should be a *disinfecting shed.* Formerly this would have been an expensive item, but, the new Lelean steam sack disinfector, which acts excellently, requires very little in the way of housing and is, in itself, cheap and economical in working. One of these should certainly be installed.

Questions of water supply, drainage and the collection and disposal of excreta, have, I see, already been raised.

When the question has advanced a stage further, I shall be glad to render any assistance I can, as regards these matters.

This memorandum is written chiefly for the purpose of indicating that I am in favour of the Powder Mills scheme and to point out the general principles which should govern the conduct of a leper asylum, and which are so woefully lacking at St. Lazare.

I have the honour to be,
Sir,
Your obedient servant,
ANDREW BALFOUR.